

Arsenic in Water Used for Drinking—An Environmental Technology Verification

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In October 2001, the U.S. Environmental Protection Agency (EPA) announced a new federal standard for concentrations of arsenic found in drinking water. The new standard was to be 10 parts-per-million (ppm). This new standard will be required by the Safe Drinking Water Act in January 2006. The previous maximum acceptable arsenic standard for drinking water was 50 ppm. Nearly 97 percent of the water systems of the U.S. affected by this new rule are small systems. The World Health Organization (WHO) is seeking reliable, easy to operate, arsenic detection systems for use in countries such as Bangladesh and India. Many people, especially located in these countries, are exposed to high levels of arsenic found in the underlying sediment of their drinking water systems. They draw their drinking water from small local and personal wells.

To meet this challenge and assist the WHO and others interested in arsenic as a possible contaminant in their drinking water obtained from above or below ground sources, the Environmental Technology Verification's (ETV) Advanced Monitoring Systems (AMS) Center performance verified four test kits that can be used to measure the concentrations of arsenic in water. A by-product of results of this verification test is that ETV can assist vendors in the marketability of their arsenic detectors. The Verification Reports are published on the ETV Internet Website at <www.epa.gov/etv/centers/center1> for public scrutiny. The purpose of this verification test was to evaluate the performance of these test kits to measure total arsenic in water under real-world conditions. Over a 19-day period water samples were collected and tested from freshwater and drinking water sources. Freshwater samples were collected from a river and two different creeks. The drinking water samples were collected from municipal, well, and treated well water sources. Two sets of laboratory performance test samples were prepared using tap water as a source: one set determined kit response to various concentrations of arsenic, while another set assessed the effects of matrix interferences on performance. Interferences tested were iron, sodium chloride and sulfide at low and high concentration levels. The test kit response was determined at arsenic concentrations ranging from 1 to 100 ppb. Performance parameters reported include: accuracy, precision, linearity, method detection limit, matrix interferences, operator bias (skill level needed), and rate of false positives/false negatives to a 10-ppb decision level. For comparison purposes, all samples, performance and real-world, were analyzed for arsenic using a laboratory reference method. The reference arsenic analysis was performed using a Perkin Elmer Sciex Elam 6000 ICPMS according to EPA Method 200.8, Revision 5.5.

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